

Breadth of view is indeed essential, if anywhere, in such an investigation as the present. A restricted insight and experience would fail to detect and to demonstrate the substantial unity of structure existing in the palate of Lizards and of Woodpeckers, still more to establish the more minute relationships between the Rhynchosaurian Hatteria and various members of the Woodpecker group. This is what has been done. The well-defined group of the Woodpeckers, including the sub-family of Wrynecks, is so connected by its embryonic and adult palatal structures with the Lizards, that the name "Saurognathæ" is to be substituted for the morphologically-unexpressive term "Celeomorphæ," applied to them by Prof. Huxley. Their palatal region is arrested at a most simple and Lacertian stage, whilst in other respects they are metamorphosed and specialised beyond any other kind of birds.

The characteristics of the Saurognathous type of palate may be summarised as follows:—Retention and ossification of trabecular cornua; great number and bilateral independence of the vomerine series of bones, some of which are azygous (vomers, septo-maxillaries, median septo-maxillary); absence of a distinct mesopterygoid, represented, however, by a long process; a dagger-shaped basipalatine between the right and left bones; absence of a distinct transpalatine; abortive development of maxillo-palatine plates, and presence of a distinct palato-maxillary on the left side only.

One of the most instructive specimens figured is *Picumnus minutus*, a woodpecker from Bahia, Brazil, of about the size of the Golden-crested Wren. In it the vomers retain in the adult the condition manifested in the young of the Green Woodpecker, and much resembling the vomers of Hatteria. In other respects it presents resemblances to various Passerines of its own zoological area; and from it the author's imagination is led down to extinct types in which the characters of the Hemipod, the low Passerine, and the Woodpecker were existent in one generalised form—a form (and a type only a step or two above the Ostrich tribe).

Numerous hints are given in this paper which lead us to look with great interest for Prof. Parker's forthcoming paper on the *Ægithognathæ* (Passerines) in the Zoological Transactions; and we may fitly close this notice with a pregnant passage referring to the *Ægithognathous* palate, showing to what problems of surpassing import these researches are supplying an answer. "I have long been familiar with its more marked peculiarities; but its morphological importance dawned upon me when I saw that the parts of that complex face, so conjugated and so metamorphosed, were really built up of elements which had their true counterparts or "symmorphs" in the Snake. But the Snake does but repeat these parts from the Amphibia; and the Amphibia borrow them from the Cartilaginous Fishes, amongst the lowest of which, namely the Lamprey, may be found the fullest development, both morphologically and functionally, of cartilages that form the substratum of the most peculiar part of a sparrow's face."

NOTES

At the meeting of the Zoological Society, on Tuesday next, Prof. Huxley will read an important paper on the Anatomy of *Ceratodus* and *Chimara*, and on the Classification of Fishes.

At the recent anniversary meeting of the French Geographical Society M. Maunoir, the General Secretary, gave a highly satisfactory report. The receipts of the Society exceed 70,000 francs; ten years ago they were only 28,000. The number of members admitted from the beginning of the year is about 350, and about 1,400 are now registered. The receipts from money taken at the doors of the Geographical Congress and from donations, amounted to 175,000 francs, and the expenses to 155,000; a sum of 20,000 francs remaining in the hands of the Society will be devoted to the publication of the congressional papers. The place of meeting of the next congress has not yet been decided upon; it will probably be St. Petersburg.

THE *Daily Telegraph* publishes further details concerning Lieut. Cameron's expedition obtained from the Madeira correspondent of the paper. Cameron, it seems, intended to remain at Loando until an opportunity arrived for sending his men home round by the Cape to the East Coast. It is understood that the traveller has accumulated some very valuable geogra-

phical materials, besides a large amount of general scientific information. It appears that he followed a large river flowing out of Lake Tanganyika in a south-westerly direction, tracing its whole course till he came upon a new lake, which he named "Livingstone." From this body of water a second large river runs westward, which Cameron, having traced it for a considerable part of its length, believes to be the Congo. It would seem that he was unable to continue along the river on account of meeting with a tribe of hostile natives. He had to choose between fighting his way through these unfriendly natives, with the risk of losing all his journals and papers, or of taking a different direction. The latter alternative seemed preferable, and though it prevented the absolute verification of his important discovery he has personally no doubt that the stream flowing out of the Livingstone Lake and the Congo are one and the same.

THE *Birmingham Gazette* understands that Sir Josiah Mason is about to make another very substantial gift to the new scientific college which he is now building at Birmingham. When the foundation-stone was laid in February last it was understood that the mere building of the college would cost 100,000*l.*, and Sir Josiah also transferred to trustees, as an endowment for the college, the piles of buildings in which his monster pen manufacture had so long been conducted. Now Sir Josiah is also about to hand over to the trustees the business itself, or rather the whole amount which he is about to receive for the concern, and which is expected to be about 100,000*l.* The whole of this sum, it is said, Sir Josiah intends to give to the college. The money will probably be invested in the names of the local gentlemen who have already been appointed trustees, and will form a permanent endowment for the institution.

A PRIVATE gentleman, being about to make a voyage to the West Indies in pursuit of objects of interest in natural science, has arranged to avail himself of the companionship and scientific services of the Rev. H. H. Higgins, of Liverpool. He will probably be away about four months cruising about the islands, and he will take with him two gentlemen—one a draftsman, and the other a collector, from the William Brown Street Museum, Liverpool. The expedition is made expressly for observations and collections in zoology and botany, and Mr. Higgins will have an opportunity of carrying on dredging operations. Very advantageous terms have, we believe, been arranged as to the division of the treasures which will be the result of the voyage. Mr. Higgins will be glad to receive suggestions with regard to the work he is about to undertake.

THE scientific public will be glad to learn that a movement has been set on foot to enlarge the existing Wigan Mining and Mechanical School, inaugurated eighteen years ago by Dr. Lyon Playfair, and now numbering nearly 200 evening students. At a public meeting held at Wigan on the 24th inst., attended by nearly all the colliery proprietors of the district, resolutions were passed, resolving to establish a permanent building with museum, laboratory, and all the appliances for giving a thorough technical education in Mining, Mechanics, Geology, Machine Construction, Steam, and Chemistry. Large subscriptions have already been promised, including 1,000*l.* from Lord Crawford and Balcarres, 500*l.* from Mr. Hewlett, the Managing Director of the Wigan Coal and Iron Company, who promise 125*l.* a year.

ON Monday the Prince of Wales opened the new Zoological Garden at Calcutta, recently formed under the auspices of the Lieutenant-Governor of Bengal.

THE Municipal Council of Paris has voted a handsome sum of money in support of the State Academies of Paris. The vote was carried by twenty-three against nineteen. The minority was composed of clericals who are opposed to the instruction given by Government, and ultra-republicans, who are opposed to the grant of any money for superior instruction.

CAPT. MOUCHEZ leaves Paris shortly to command the war vessel which is to complete the Hydrographical Survey of the Algerian coast. The expedition is expected to be away for a full year.

MR. HENRY WILLETT, the hon. secretary of the Sub-Wealden Exploration, has issued his 14th quarterly report. He states that the contractors are laudably endeavouring, at their own cost, to enlarge the bore-hole, so as to enable them to reach 2,000 feet and to produce cores undeniably satisfactory to the promoters. Mr. T. Warner, of Brighton, is willing to contribute 400*l.* in all for the next 500 feet after 2,000 feet. The ultimate decision as to the continuance of the work will rest with the central committee in London, who will, of course, be guided mainly by the question of finance.

INTELLIGENCE received at Madrid on the 28th from the Philippines announces that a terrible hurricane swept over the provinces of Albay and Camarines, in the southern part of the Island of Manilla, on the 30th of November. Two hundred and fifty persons are stated to have been killed, and 3,800 inhabited houses, the crops, and a considerable number of animals were destroyed. General consternation prevailed in Manilla.

THE French Society of Ethnography has granted its great medal to the memory of Doudard de Lagrée, the organiser of a scientific exploration on the banks of the Mekong in Indo-China.

THE official paper of the Governor-General of Algeria announces that the Algerine Meteorological Board has completed its organisation and will be very shortly placed in communication with the international service presided over by M. Leverrier. Weather telegrams from various places will be sent daily.

THE Academy of Sciences held its anniversary meeting on Monday. M. Bertrand delivered an *éloge* on General Poncelet, the great geometer and mathematician, who died twelve years ago, leaving a number of most valuable books, of which a general edition has been published recently. Amongst the prizes distributed was one to M. Denayrouze for his apparatus for working in mines and for submarine explorations.

THE cultivation of coffee in India is steadily progressing, and although the introduction of the plant into the eastern portions of the country is of ancient date, it is only within the last twenty years that much attention has been given to its production. The principal plantations are situated in Mysore and the Neilgherry Hills, at an elevation of 3,000 to 4,000 feet above the level of the sea. The climate of these districts, besides being well adapted to the cultivation of the coffee-plant, is not so injurious to the health of Europeans as many other parts of the country, and it is probable that the industry will be largely developed. In 1842 the value of coffee exported from British India was 74,957*l.* Ten years later it had advanced to 84,306*l.*; in 1862 to 462,380*l.*, till in 1872 it had increased to 1,380,410*l.*

At the same time the cultivation of tea is advancing even more rapidly, though its introduction is much more recent. The Assam tree is celebrated for its fine quality. The existence of this tea-producing country was only recognised in 1834, when Lord Bentinck introduced some Chinese growers, and the trade became firmly established. In 1842 the value of tea exported was 17,244*l.*; in 1852, 59,220*l.*; in 1862, 192,242*l.*; and in 1872, 1,482,186*l.*

THE *Journal of the Asiatic Society of Bengal*, vol. xlv. part 2, contains a paper by Capt. J. Waterhouse, Assistant Surveyor-General of India, on "Photography in connection with the Observation of the Transit of Venus at Roorkee."

THE Report of the Dundee Free Library Committee is drawn up with great care and considerable elaboration, and contains

some very useful statistics as to the numbers of books issued in various departments, and the classes to which the readers belong. As might be expected the books taken out in light and miscellaneous literature are in an overwhelming majority, though those belonging to the various sciences have a creditable amount of patronage which we hope to see gradually increase. We think a more satisfactory classification of the sciences might be adopted than that contained in the Report. The Natural History Museum connected with the Library is evidently being enriched with valuable specimens, and we are glad to see the Naturalists' Society is prospering. There is also a University Club housed in the building, which numbers 140 members, and "seeks in the first instance to foster Culture and the Higher Education, with the ulterior object of cultivating public opinion in the direction of University extension in Dundee."

THE ravages of the Phylloxera among the vines have caused many attempts to be made to discover a new kind of beverage which might take the place of the juice of the grape. The Marquis de Villeneuve reports that in China a *pseudo* wine called *Tsien-ia* is much used, which is concocted from a preparation of four plants, common in that country, and mixed together in certain proportions. The plants are dried and powdered, and made into a paste, which is sold in the form of balls or squares at the rate of about 3*d.* a pound. One square or ball will make several pints of a fermented liquor, pleasant to the taste and much resembling wine, which is much sought after by Europeans and others living in China. A factitious brandy is also prepared in the same way, and the manufacture is so simple that with a capital of 5*l.* or 10*l.* to purchase the apparatus, a man may make twenty-five gallons of "brandy" a day. The Marquis de Villeneuve affirms that the "wine" thus produced is of good quality and possesses no injurious ingredients.

PART 2 vol. i. of the "Transactions of the Watford Natural History Society" is to hand, containing the four papers read on May 13 last, besides a number of miscellaneous notes and observations.

MR. G. H. KINAHAN has published a paper read by him at the Royal Historical and Archæological Association of Ireland, on some prehistoric antiquities in the neighbourhood of Drumdaragh, Co. Antrim.

ABOUT a year ago we noticed the publication by the New England Society of Orange of the "Babbit Portfolio," containing some beautiful photographs of remarkable trees in the neighbourhood of Orange. The same Society has recently issued the "Haskell Portfolio" (after a well-known citizen of Orange), containing photographs of other fine trees, even finer in execution, we think, than the previous ones. The trees represented are the Condit Chestnut (*Castanea vesca*), the Sugar Maple (*Pyrus malus*), the Park Tulips (*Liriodendron tulipifera*), and the Essex Maple (*Acer rubrum*).

WE have received the Report of the first Annual Conference and Exhibition of the Cryptogamic Society of Scotland, held at Perth on Sept. 29, 30, and Oct. 1; both conference and exhibition seem to have been a complete success.

STATISTICIANS calculate that there are now in work some 200,000 steam-engines, with a total power of 12,000,000 horses, corresponding to the muscular strength of 100,000,000 men.

ALMOST all the Carthaginian antiquities which had been sunk with the *Magenta* have been recovered by Denayrouze's diving apparatus and submarine lamp.

THE additions to the Zoological Society's Gardens during the past week include a Black Lemur (*Lemur macaco*) from Madagascar, presented by Captain Burke; a White-fronted Lemur (*Lemur albifrons*) from Madagascar, a Night Parrot (*Stringops*

habroptilus) from New Zealand, a Grey Ichneumon (*Herpestes griseus*) from India, deposited; a Yellow Baboon (*Cynocephalus babouin*) from W. Africa, purchased; a Gavial (*Gavialis gangeticus*) from India, presented by Capt. Barnett: a Common Fox (*Canis vulpes*) European, presented by Mr. W. Saville.

SCIENTIFIC SERIALS

THE *Journal of the Royal Agricultural Society of England*, Second Series, No. xxii.—The contents of this number are most attractive. To science is assigned the leading place in the arrangement. The first paper is devoted to the Colorado potato-beetle, and is from the pen of Mr. Bates, F.L.S., who does not profess to impart any original information, and who is unable to come to any definite conclusion as to the probability of its appearing in these countries. The paper is calculated to confuse rather than to enlighten us on this point. For while in one place the author goes to show that the possibility of living specimens arriving here cannot be doubted, he observes elsewhere that the analogies of the case supply ground for confidently believing that there is exceedingly little probability of their propagating and spreading in this country. We are also told that "the creature has developed extraordinary flexibility of constitution and habits since it left its quiet home in the Rocky Mountains, and that we cannot be quite sure what it will eventually do." In another passage Mr. Bates says:—"The potato-beetle is no insidious enemy, like the majority of insect plagues, but meets the farmer in open fair fight." What does he mean by a fair fight between an insect which destroys whole fields and districts, and the helpless farmer?—Mr. Carruthers, F.R.S., consulting botanist to the Society, contributes a paper and a note on the potato disease. In the "paper" he reports on what he calls the results of the competition for the prizes offered through the Society in 1874 for potatoes which would resist the disease for three years in succession. The "note" gives a brief account of Mr. Worthington Smith's discovery of the resting spore of the potato fungus. The paper must have been written before the discovery. The truth is the discovery throws a curious shadow not only on the paper but on the course pursued by the society in connection with the whole subject. We were not quite prepared to find that the consulting botanist of this great society would be permitted to announce, as he has done in this paper, that in investigating this disease we must summarily dismiss the soil from our consideration. "Neither soil, nor methods of cultivation," we are told, "exercise any influence on the prevalence of the disease." For the present we can only say these statements are as unsound as they are astounding. The *Journal* contains a long paper on laying down land to permanent pasture, which is a joint production. The bulk of the information is given second-hand; that is to say, on information furnished by several agriculturists, a long paper is based by the joint authors. The number contains too much matter of this character. The views of an American naturalist on the Colorado potato-beetle are given in a paper by Mr. Bates. Mr. Carruthers seeks to enlighten us on the potato disease by information collected from various sources; and a number of scattered facts on one of the most important of agricultural subjects—the profitability of pasture as compared with arable land—are grouped and reviewed in a great variety of ways, some of which are calculated rather to mislead than to enlighten the reader. There are several passages in the paper which will produce the impression that the gentleman to whom has been assigned the chief part of the joint authorship is not intimately acquainted with agriculture as at present practised. We take one passage as an illustration: "There are many persons so enamoured of a special rotation—say the four-course—that to extend the period of artificial grass to two years appears to them a violation of all the true principles of scientific farming. The four-course is their ideal of modern farming. A course of cropping which has been proved highly beneficial on some of our most famous corn-growing districts is supposed to be the only legitimate system to be pursued by intelligent farmers elsewhere." Who are the persons referred to? It may be well to remind the gentleman who wrote this paper that English farmers are calling out for more freedom of action in the cropping of their land, and that for several years past vast numbers of them have been doing that which he would appear to have discovered in 1875. We cannot at present make room for further criticism on this paper; and we are glad to be able to state that the number contains several meritorious articles.

THE *Journal of the Chemical Society* for November contains Dr. Hofmann's Faraday lecture, entitled "The Life-work of Liebig in Experimental and Philosophic Chemistry; with allusions to his influence on the development of the collateral sciences and of the useful arts." The lecture is illustrated by a portrait of Liebig, and an autotype copy of a letter from Liebig to Faraday.—Prof. J. W. Mallet contributes a paper on achrematite, a new molybdo-arsenate of lead, and Mr. W. J. Lewis a note on the crystallography of Leucaurin, being an appendix to a former paper by Messrs. Dale and Schorlemmer.—The journal contains its usual number of valuable abstracts from foreign periodicals.

Morphologisches Jahrbuch.—In the second part of this journal Dr. B. Solger discusses the homology of the cervical vertebrae and nerves in the Sloths, and concludes that the vertebrae up to the 22nd are homologous in *Cholepus* and *Bradypus*, but that the homologies of the first twelve nerves cannot be determined; the nerves from the 13th to the 23rd are homologous.—Another paper by Dr. Solger describes two cartilaginous pieces in the visceral skeleton of *Chimara monstrosa*, which appear to have been hitherto unnoticed.—Dr. Hermann Fol gives an account of the so-called endostyle of Huxley in various genera of Tunicata, and appears to establish it satisfactorily as a slime-gland. Excellent figures of its ciliated and glandular epithelia are given.—Prof. Gegenbaur devotes twenty-two pages to a consideration of the omohyoid muscle, which he believes to be a remnant of a continuous muscle whose origin extended from the sternum along the clavicle to the scapula. He also gives an account, with microscopic sections, of the nipples in *Didelphys* and in *Mus dummanus*.—Dr. Carl Hasse's paper on *Amphioxus lanceolatus* is devoted to a demonstration of the structure of the eyespots, in which he finds cells which may be designated optic cells, as distinguished from the pigment-cells.—Prof. Gegenbaur occupies forty-seven pages with a detailed and very hostile criticism of Götte's recently-published work on the Development of the Toad as a basis for the Comparative Anatomy of the Vertebrata. He censures it in very many respects as empirical and unscientific.

Jahrbuch der kais.-kön. geologischen Reichsanstalt, band xxv. No. 2.—In this number of the Jahrbuch, Dr. E. Tietze, who has been some time in Persia, describes the springs and spring-formations that occur in Demavend mountain and its neighbourhood; most of the springs are thermal, and deposit large quantities of calcareous tufa.—The next paper gives details of the work done in the chemical laboratory of the Geological Survey, and includes upwards of 200 analyses.—Dr. C. Doelter describes the geological structure, the rocks, and minerals of the Monzoni Alps in the Tyrol. This paper is illustrated with a geological sketch-map and two plates of minerals.—Among the "Mineralogical communications" the most generally interesting paper is one by Professor Fuchs on the earthquakes and volcanic eruptions of 1874. He enumerates 123 earthquakes, distributed as follows:—Winter 37; (Jan. 12, Feb. 15, Dec. 10); Spring 32; (March 12, April 11, May 9); Summer 25; (June 7, July 5, Aug. 13); Autumn 29; (Sep. 9, Oct. 9, Nov. 11).—The remaining papers are these:—"On Sahlite as a rock-constituent," by E. Kallowsky; "On the chemical composition of meionite," by E. F. Néménar; "On Lievrite," by L. Sipőcz; "On the minerals occurring in the metalliferous veins of the Příbram region," by F. Babanek; "On rocks from the island of Samothracia," by J. Niedzwiedzki.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 9.—"On some Electro-magnetic Rotations of Bar-magnets and Conducting-wires on their Axes," by G. Gore, F.R.S.

In all the published forms of Ampère's experiment of the electro-magnetic rotation of a vertical bar-magnet or conducting-wire upon its axis by Ampère, Faraday, Sturgeon and others, the magnet or wire has either been immersed a large portion of its depth in mercury, or its middle part has been connected by a wire with a surrounding annular channel filled with mercury, and the electric current passed into or out of the magnet or wire by means of that liquid, and the mercury has formed an essential part of the arrangement.

In all published cases of rotation of bar-magnets on their axes by the influence of electric currents, the two ends of the magnet